state of our knowledge perhaps a classification based upon such principles is the most satisfactory. The matter is, however, one of considerable difficulty, as nearly all drugs exert many physiological actions not always differing only in degree, but in some cases actually in kind. It is, from the nature of the case, therefore obligatory to take one action of a drug as determining its position in one or other group. As an instance we may cite caffeine. Dr. Dixon places this drug by virtue of its action in the group of diuretics; if we, however, follow the text we find that considerable space is of necessity devoted to the other, almost equally important, actions of this alkaloid.

It is difficult in a review of ordinary dimensions to do adequate justice to a work of this character, and in the remarks which follow we shall confine ourselves to a few salient points which strike us as being likely to interest the medical and general scientific reader. In the first place, it seems that on account of the entire absence of all reference to original literature the book is not intended to be a book of reference; further, the absence of information with regard to pharmacological technique obviously places the book in the library rather than in the laboratory. As the author states clearly in his preface, several of the facts are new, and doubtful statements have been verified by experiments performed in his own laboratory. In this connection we must say at once that the reader will have carefully to consider the magnitude of the evidence with regard to these new facts and verifications of doubtful ones. The therapeutics included in Dr. Dixon's work are only such as to illustrate the pharmacology; from this it clearly follows that the book is not intended for those engaged in the practice of medicine. Materia medica is only briefly dealt with, although in many cases very abstruse details and complicated formulæ with regard to the chemical composition of substances, such, for instance, as hydrastine, are given. We think such details cannot be of use to the ordinary student of pharmacology, and to be of any value to the pharmacological or chemical worker should be accompanied by a reference to the literature from which they are derived; and here we will observe that although in his preface the author mentions a list of standard works dealing with pharmacology and materia medica to which he is indebted, all reference, so far as we can find, to books dealing with the question of the chemical composition and reactions of, for instance, the alkaloids and their derivatives is omitted.

The first thirty-eight pages of the book are devoted to general considerations, amongst which perhaps the most attractive is a discussion of the relation between physiological action and chemical constitution. This interesting subject is treated at some length, and most of the important facts bearing upon it are carefully considered. Under the heading of the standardisation of drugs, the author discusses the question of physiological standardisation. He rightly directs attention to the extreme difficulty of standardising certain preparations according to their chemical content, and we entirely agree that, in the case of certain drugs, standardisation of a physiological type should be adopted; that is, different preparations should be compared with regard to their action upon a constant tissue unit. Such a method has been successfully adopted, under even more complicated conditions, in the comparison of the relative toxicity of certain sera. We must confess, however, that we are in this connection somewhat surprised to read that the cardiac glucosides can be standardised by perfusing the isolated rabbit's heart with Ringer's solution and subsequently adding the drug. The author must either be under some misconception with regard to the composition of Ringer's solution or be in possession of important facts which, so far as we are aware, he has not published.

From chapter iii. on, the book is devoted to descriptions of the characters, preparations, and physiological actions of the official, and some important unofficial, remedies and drugs. The action of each drug is most exhaustively considered, and in most cases illustrated by one or more curves, the result in the vast majority of cases of the author's own experimentation. The amount of space devoted to these curves is certainly a feature of the work, and renders to it, at least from one point of view, a unique value; as, however, usually no discussion of the conditions of the experiment accompanies the curves, the reader has too often to take upon trust the conclusions based upon them.

The mass of the pharmacology of the more purely inorganic substances is prefaced by a short but complete discussion of salt action and some of the chief bearings of modern physical chemistry upon pharmacological action.

The final chapter of the book is devoted to ferments, vegetable toxins, internal secretions, serum-therapy, and antagonism. The work concludes with an exhaustive index.

Dr. Dixon's "Manual" is certainly an important addition to standard pharmacological literature, and if in our opinion its educational value, taken as a whole, is less than that of certain of its contemporaries, this is to some extent due to the curious position its subject-matter holds in the complicated medical education of to-day. We have no hesitation in saying that it should be possessed by every pharmacologist and pharmacological laboratory, if only as containing a number of original experimental results worthy of control and further investigation.

A PIONEER IN BIOLOGY.

Jan Ingen-Housz. Sein Leben und sein Wirken als Naturforscher und Arzt. By Prof. Julius Wiesner. Unter Mitwirkung von Prof. Dr. Th. Escherich, Prof. E. Mach, Prof. R. von Toply, und Prof. Wegscheider. Pp. x+252. (Vienna: C. Kowegen, 1905.)

DR. WIESNER relates that on his becoming professor of plant physiology in the University of Vienna, more than thirty years ago, he resolved to become familiar with the work of the founders of that science. Soon he became peculiarly interested in

the labours of Ingen-Housz, and found that his real worth had not been recognised. Much information was gathered that showed how many-sided his activities had been in science and in medicine, and Prof. Wiesner was induced by the meeting of the International Botanical Congress at Vienna to present the results of his labour of love in this volume. It must rank as a classic, admirable as a biography of a leader in research and as a history of scientific progress in a most important field of study.

Jan Ingen-Housz was born at Breda, in Brabant, South Holland, on December 8, 1730, and attended the higher school there until the age of sixteen, after which he continued his education in the Universities of Louvain, Leyden, Paris, and Edinburgh, even after he had graduated (at the age of twenty-two) in Louvain. From 1757 to 1765 he practised medicine in Breda, but, after the death of his father, he went to London, on the invitation of Sir John Pringle, the King's physician. Here he became acquainted with distinguished anatomists and medical men, and made a study of the method of inoculation for small-pox. From London he went to Vienna, by the wish of the Empress Maria Theresa, and introduced the use of inoculation there.

He frequently visited Switzerland, France, Holland, and England. For the last country he had an especial affection, regarding it as the land in which science was most honoured and furthered. He died in 1799, near London, while on a visit to the Marquis of Lansdowne.

Ingen-Housz approached the research which has brought him most fame—the relation of plants to the atmosphere—from the standpoints of the physicist and chemist rather than the botanist, and with a view to the value of green plants exposed to daylight as purifiers of the atmosphere from the products of animal respiration. He had busied himself with the physical problems of electricity, magnetism, optics, and heat, and had made useful contributions to their investigation. His researches in chemistry led to improvements in the preparation of matches and in other matters of practical value.

A very valuable advance in microscopical technique introduced by him was the use of a cover over the drops of water or other fluids in which the objects were included for examination. At first the covers were made of mica, but soon he employed thin glass covers, as is now the custom.

His researches into the nutrition of plants were for the most part carried on during his stay in Vienna, although his first work on the subject was published in London in 1779 under the title "Experiments upon Vegetables, discovering their great Power of Purifying the Common Air in the Sunshine, and of Injuring in the Shade and at Night." It was soon issued in German and Dutch translations.

When Ingen-Housz began the researches that led him to such great results it was generally taught that plants extracted from the soil the materials of which they were in want in the conditions in which they exist in the plant, and that nothing of importance required to, or did, pass off from plants. That gas was given off had been determined by Priestley and by Scheele, who had investigated the relations of green plants with the atmosphere; but Priestley arrived at the conclusion that these plants always freed the atmosphere from the "fixed air" (carbon dioxide) emitted by animals and emitted "dephlogisticated air" (oxygen), and Scheele believed that they always added to the amount of the "fixed air."

Ingen-Housz succeeded in showing that both these eminent chemists were right in part, the green parts in daylight emitting "dephlogisticated air," while parts not green at all times, and even green parts in darkness, like animals, emitted "fixed air." His views were combated, even Priestley joining in attacking them, and by his authority preventing their importance from being recognised as it deserved to be.

The new foundation for chemical investigation afforded by Lavoisier's discoveries was made use of by Ingen-Housz to explain more fully the nutrition of green plants than had been possible until the recognition of the composition of the "dephlogisticated air" and the "fixed air," and he showed that the carbon contained in plants is derived from the carbon dioxide of the atmosphere instead of from the soil as had been supposed by Senebier. He also showed that the carbon could be acquired by green plants only in light, and that carbon dioxide beyond a limited degree of concentration in the atmosphere proved harmful even to plants as well as to animals. He thus distinguished between the respiration and the assimilation in plants, a distinction not fully realised or taught by botanists until many years later. The value of humus and of vegetable manure as food for plants he ascribed, not to the substance being directly employed by the plants as food, but to its effect on the mineral contents of the soil, which were rendered more easy of absorption, and he demonstrated that diluted mineral acids produced similar beneficial effects. His later views on the nutrition of plants are given in "An Essay on the Food of Plants and the Renovation of Soils," which is contained in a collection of essays (in which it is No. 3) issued under the title "Additional Appendix to the Outlines of the Fifteenth Chapter of the Proposed General Report from the Board of Agriculture on the Subjects of Manures," London, 1796.

An appendix stating the sources of information about Ingen-Housz, with extracts from letters and a bibliography of his writings, adds to the value of the volume, and supports Prof. Wiesner's claim that he must be classed among the founders of botany, and that he showed singular ability also as an investigator in physics and in medicine.

ANALYSIS OF PAINTS.

The Chemistry of Paints and Paint Vehicles. By Clare H. Hall. Pp. vi+134. (London: Constable and Co., Ltd., 1906.) Price 8*s.* net.

THIS book or booklet is not intended to appeal to the artist, the house-painter, or the manufacturer, but to the young analyst who has had little or no experimental acquaintance with the materials discussed in its pages. The scope of the volume is indeed extremely limited, since it deals with the ex-